

Directional Prefixes in Mu-nya*

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Summary

Mu-nya is a Tibeto-Burman language spoken among Tibetan people living around Mt. *Minya Konka* in Sichuan Province, Southwest China. As Huang (1985) points out in detail, Mu-nya has rich vowel alternation in the verb predicate. Although her description was exhaustive, it was complex. It was thus challenging to grasp the mechanisms behind grammatical operations from her work. Mu-nya discriminates eight kinds of directions through verb prefixes: 1. /tu-/ ‘upward’ 2. /ne-/ ‘downward’ 3. /ɣu-/ ‘towards upstream’ 4. /fia-/ ‘towards downstream’ 5. /ngu-/ ‘towards the speaker’ 6. /tʰe-/ ‘away from the speaker’ 7. /ru-/ ‘rounding’ 8. /qʰu-/ ‘non-specific’. Some directional prefixes do not express real direction but are fixed combinations with specific verbs, like /qʰu³³- ri⁵⁵/ ‘write’, which dose not take other prefixes flexibly. Some vowel changes occurring in directional prefixes are caused by grammatical operations such transitivity. For instance, the directional prefix: /ne³³-/ ‘downward’ in an intransitive verb predicate, changes into /ni³³-/ in a transitive verb predicate. Examples reflecting this phenomenon are as follows: /va⁵⁵ ne³³- rɔ⁵⁵=su³³/. ‘(The) butter has melted.’ and /ɲi⁵⁵ va⁵⁵ ni³³-rɔ⁵⁵ ɲe³³/. ‘I (have) melted (the) butter.’ In this report I describe the basic grammatical functions and vowel changes of the directional prefixes in the Mu-nya language.

Key words: directional prefix, vowel alternation, transitivity, controllable verb, causative

关键词：方向前缀、元音交替、及物性、可控动词、致使结构

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1. Introduction

The Mu-nya language belongs to the Qiangic branch of the Tibeto-Burman language family. It is spoken by about 10,000 Tibetans who live around Mt. *Minya Konka* in Sichuan, southwest China.



Map The Mu-nya (WrT. *Mi nyag*) Area

Since the Mu-nya people share the same tribe name as the ancient Tangut, corresponding to *Minyag* in written Tibetan, the relationship between these two languages has been considered by many scholars. However, it is not easy to compare them directly, as Tangut is a medieval written language recorded in Tangut characters. On the other hand, Mu-nya does not have a writing system, and modern colloquial Mu-nya may have faced drastic changes in its phonology, morphology, and syntax through history. Thus, it is essential to analyze morphological/syntactic structure and phonetic changes in both languages very carefully to determine if they reflect overlapping aspects in their development.

Mu-nya has a vowel alternation system in its verb predicate: Huang (1985; 2009) introduced this vowel change phenomena in detail. Although her description was exhaustive, it was complex: various vowel changes occur in the directional prefixes, most of which result from assimilation to the vowel in the verb stem. Yet these merely phonetical-level phenomena also include phonological-level alternations caused by grammatical operations such as changes in transitivity which must be distinguished to accurately describe Mu-nya morphology. Hereafter, I will focus on the function of directional prefixes in the language, and analyze the vowel changes resulting from grammatical operations.

2. Verb Predicate Structure in Mu-nya

The basic verb predicate structure in the Mu-nya language can be described as follows:

❖ Structure of Mu-nya Verb Predicate

| | Dir Prefix - Stem | (=Suffix) / (=Modal) | Declarative |
|--------------|-------------------------------------|-------------------------------|--------------------|
| Alternation: | causative (person)* └──────────┘ | < person (aspect) / (mood) | evidentiality |
| | Verb | | |

*When the verb takes no suffixes, vowel alternation appears on the stem.

- (1) ηi^{55} $p\phi^{55} \gamma\tilde{u}^{33} ndu^{55}$ $k^h u^{33} - ri^{55} = p\phi^{33}$ ηe^{55} .
 1sg. [ERG] Tibetan letters DIR-√write =SFX:impft DEC [+certain]

‘I write Tibetan letters.’

Mu-nya has eight kinds of directional prefixes, which show the directionality of the verb, but they do not express aspect. A SFX comes after a verb stem and expresses the perfect/imperfect aspect of an action or behavior. However, the aspects do not express tense directly. A modal AUX appears at the position of SFX when necessary. DEC is a part of speech, which appears at the end of a sentence, representing the evidentiality of the speaker’s statement.

Mu-nya has three kinds of basic declaratives: / ni^{33} /, / ηe^{33} /, and / ti^{33} /. / ni^{33} / is used for general statements [–certain, –confirm] independently, and rarely used with 1st person subject. / ηe^{33} / is used for statements with certainty [+certain, –confirm], generally in 1st person sentences. And / ti^{33} / is used for a confirmed statement [+confirm, +certain], often something with the speaker’s own eyes or a personal discovery.

Additionally, another declarative / ra / [+realize] is used in verb predicates in the perfective aspect to express a statement with awareness by (something) occurrence or happening to the speaker.

The Mu-nya verbs can be classified into three groups according to their distribution in combination with SFXs and DECs: controllable verbs [cV] (/ $fi a^{33} - ndzu^{55}$ / ‘eat’), uncontrollable verbs [ucV] (/ $t^h \Lambda^{33} - q \Lambda^{55}$ / ‘scared’), and stative verbs [stV] (/ $ndz e^{55}$ / ‘have’). Mu-nya also has a vowel alternation system in the Vp corresponding to the person of the subject.¹

¹ See IKEDA (2013a, 2013b) for more detail.

3. Direction-marking Verb Prefixes

The Mu-nya verb consists of a directional prefix and a stem. Mu-nya has eight kinds of directional prefixes:

| Direction | prefix | Direction | prefix |
|-----------------------|-----------|--------------------------|-------------------------|
| 1. upward | tu- Vstem | 5. towards the speaker | ngu- Vstem |
| 2. downward | ne- Vstem | 6. away from the speaker | t ^h e- Vstem |
| 3. towards upstream | yu- Vstem | 7. rounding | ru- Vstem |
| 4. towards downstream | fa- Vstem | 8. non-specific | q ^h u- Vstem |

The primary function of these prefixes is to express the direction of an action. However, some verbs take fixed prefixes with no regard for real direction, while stative verbs take no directional prefix, such as /ndzɛ⁵⁵/ ‘have’, /nɛ⁵⁵/ ‘know’ etc.

See examples of a verb /xu⁵⁵/ ‘go’ (and /rɛ⁵⁵/ ‘come’) with DIR expressing real direction below:

/tu³³- xu⁵⁵/ ‘go up’

/ne³³- xu⁵⁵/ ‘go down’

/yu³³- xu⁵⁵/ ‘go up stream’

/fa³³- xu⁵⁵/ ‘go down stream’

/ngu³³- rɛ⁵⁵/ ‘come over’

/t^he³³- xu⁵⁵/ ‘go away’

Two further examples of the verb /qo⁵⁵/ ‘dig’ with some different DIRs expressing real directions as below:

/fa³³- qo⁵⁵/ ‘dig into from upper place’ < {fa-} towards down (stream)

/ɸo³³- qo⁵⁵/ ‘dig horizontal: make a cave’ < {yu-} towards up (stream)

However, sometimes a directional expression in Mu-nya is incongruous with our ordinal sense of direction:

/to³³- qo⁵⁵/ ‘dig down into’² < {tu-} upward

²This example may correspond to phrases such as ‘dig up (frozen land / the tree by its roots)’ in English or ‘hori-okosu 掘り起こす’ in Japanese.

Some verbs are generally used in fixed combinations with specific DIRs without expressing real directions:

- /rɯ³³- tɕɯ⁵⁵/ ‘put; place’ cf. {rɯ-} rounding
 /t^hɛ³³- mɯ⁵⁵/ ‘forget’ cf. {t^hɛ-} away from the speaker
 /t^hi³³- ju⁵⁵/ ‘buy’³ cf. /q^hɛ³³- tɛ⁵⁵/ ‘sell’ < {q^hɯ-} non-specific

Even though these types of verbs are fixed with a specific DIR, it is occasionally possible to take on other DIRs to express literal directions as:

- /k^hɯ³³- ri⁵⁵/ ‘write’ cf. {q^hɯ-} no specific direction
 /nɛ³³- ri⁵⁵/ e.g. ‘write [Chinese characters] vertical (on a blackboard)’

4. Adjectives with Directional Prefixes

A Mu-nya adjective in a predicate should be a poly-syllabic or duplicated mono-syllabic form, like /xɛ³³xɛ⁵⁵/ ‘quick/fast’.

- (2) ʔɛ⁵⁵tɯ³³ t^hi³³-dʒu⁵⁵ xɛ³³xɛ⁵⁵ ni³³. / ti³³.
 3sg. DIR-run fast DEC [general] / [discover]

‘S/he runs fast.’

*When the speaker did not know s/he ran so fast that they expressed the discovery with a DEC /ti³³/ in this sentence.

Most Mu-nya adjectives are represented by duplicated mono-syllabic forms /ni³³ni⁵⁵/ ‘few’, /q^hɿ³³q^hɿ⁵⁵/ ‘(animal) thin’ with comparative and superlative forms along the lines of: /ni³³ni⁵⁵/ ‘few’ ~ /ka³³- ni⁵⁵/ ‘fewer’ ~ /zɯ³³- ni⁵⁵/ ‘fewest’. Contrastively the Mu-nya verbs consist of a directional prefix and a verb stem like /q^hɛ³³- tɛ⁵⁵/ ‘buy’: {q^hɯ³³-}[no specific direction]) + √tɯ⁵⁵.

There is another type of verb derived from an adjective, which consists of a directional prefix and an adjective stem, as in /nɿ³³- q^hɿ⁵⁵/ ‘(animal) be thin’: {nɛ³³-}[downward]) + √q^hɿ⁵⁵. It is unknown which direction such derived verbs take, even though they may have fixed combinations.

³ Vowel alternation occurs in the directional prefix in this verb ‘buy’. See Section 5 below.

5. Vowel Assimilation in Directional Prefixes

The vowel in the prefix is sometimes assimilated to the stem of the verb. Sometimes the assimilation takes effect within the initial part of the directional prefix: /k^hɯ³³- ri⁵⁵/ ‘write’ < {q^hɯ³³-} ‘no specific direction’, compare /q^he³³- t^he⁵⁵/ [~ q^hΛ³³- t^hΛ⁵⁵] ‘buy’. This phonetic change occurs sporadically, and is unstable, and belongs to the phonetic level. See below.

- (3) (na⁵⁵) ɕoo³³to⁵⁵ tɯ³³- ze⁵⁵ !
 (2sg.) umbrella DIR- take

‘(You) take an umbrella!’

- (4) ŋi⁵⁵ ɕoo³³to⁵⁵ tø³³- zø⁵⁵ ŋe³³.
 1sg.[ERG] umbrella DIR- take DEC [+certain]

‘I took my umbrella with me.’

The verb stem /ze⁵⁵/ in the example sentence (3) is in the imperative form, hence the vowel is altered to /e/, but the directional prefix does not show assimilation in this case. In contrast, the directional prefix in the same verb in a 1st person (sg.) declarative sentence (4), assimilates to the vowel. The reasons why we consider this type of alternation in a directional prefix a phonetic phenomena are as follows: [1] The altered vowel in the prefix agrees with the verb stem by regressive assimilation. [2] It is difficult to predict when it will occur. [3] This type of alternation does not serve any function in distinguishing words or causing grammatical operations.

On the other hand, there are other directional prefixes which do not assimilate to the vowel in a verb stem. Many consist of a fixed combination with a stem, like /fia³³- ndzu⁵⁵/ ‘eat’, /k^hɯ³³- ri⁵⁵/ ‘write’, etc., and they do not show the literal direction of the verb.

Huang (1985) made an exhaustive figure of alternation in directional prefixes and tried to clarify the vowel assimilation system in Mu-nya. Nonetheless, the paradigm is too complex and not easy to grasp because it includes all alternations and assimilations at different levels. This study seeks to further her findings.

6. Vowel Change with Grammatical Operation

Among all the vowel changes in directional prefixes listed in the figure in Huang (1985), the vowel alternation into /i/ (from lax vowels) and /e/ (from tense vowels) is the only one which is NOT a phenomena of assimilation at the phonetic level. It represents a derivation from an uncontrollable to a controllable verb at the morphophonemic level of grammatical operation as follows:

A. lax vowels in prefix: /ɯ/ /e/ → /i/

e.g. /k^hɯ³³- ndzɯ⁵⁵/ ‘stick’ [ucV] → /k^hi³³- ndzɯ⁵⁵/ ‘stick on’ [cV]
 /k^hɯ³³- / < {q^hɯ³³-} ‘no specific direction’

(5) ɕoo⁵⁵vɯ⁵⁵ k^hɯ³³- ndzɯ⁵⁵ = suɯ³³. → * k^hi³³- ndzɯ⁵⁵ = suɯ³³.
 paper DIR- stick =SFX:pft DIR- stick =SFX:pft

‘(The pieces of) paper has stuck.’

(6) ŋi⁵⁵ ɕoo⁵⁵vɯ⁵⁵ ʔe⁵⁵tsuɯ³³ = le³³ k^hi³³- ndzɯ⁵⁵ ŋe³³.
 I [ERG] paper this =DAT DIR- stick DEC [+certain]

‘I (have) stuck (the piece of) paper on this.’

This alternation derives cV from ucV. See another example of the vowel /e/.

e.g. /ne³³- rø⁵⁵/ ‘melt’ [ucV] → /ni³³- rø⁵⁵/ ‘melt’ [cV]

(7) va⁵⁵ ne³³- rø⁵⁵ = suɯ³³. → * ni³³- rø⁵⁵ = suɯ³³.
 butter DIR- melt =SFX:pft DIR- melt =SFX:pft

‘Butter has melted.’

(8) ŋi⁵⁵ va⁵⁵ ni³³- rø⁵⁵ ŋe³³.
 I [ERG] butter DIR- melt DEC [+certain]

‘I (have) melted (a piece of) butter.’

See below another example of vowel alternation to /e/ from tense vowels.

B. tense vowels in prefix: /ə/ /ʌ/⁴ → /e/

e.g. /t^hə³³- ra⁵⁵/ ‘dry’ [ucV] → /t^he³³- ra⁵⁵/ ‘dry sth. up’ [cV]

(9) pɛɛ³³re⁵⁵ t^hə³³- ra⁵⁵ = su³³.
 towel DIR- dry =SFX:pft

‘The towel has dried.’

(10) ŋi⁵⁵ pɛɛ³³re⁵⁵ t^he³³- ra⁵⁵ ŋɛ³³.
 I [ERG] towel DIR- dry DEC [+certain]

‘I have dried the towel.’

The ucV /t^hʌ³³- qʌ⁵⁵/ ‘scared’ mentioned above also demonstrates this kind of alternation and produces cV /t^he³³- qʌ⁵⁵/ ‘frighten’.

e.g. /t^hʌ³³- qʌ⁵⁵/ ‘scared’ [ucV] → /t^he³³- qʌ⁵⁵/ ‘frighten’ [cV]

(11) ʔɛ⁵⁵tsu³³ t^hʌ³³- qʌ⁵⁵ ra³³.
 3sg. DIR- scared DEC [+realize]

‘S/he was scared.’

(12) ŋi⁵⁵ ʔɛ⁵⁵tsu³³ t^he³³- qʌ⁵⁵ ŋɛ³³.
 I sg. [ERG] 3 sg. DIR- scared DEC [+certain]

‘I have frightened him.’

cf. (13) ʔɛ⁵⁵tsu³³ ji⁵⁵ = le³³ t^hʌ³³- qʌ⁵⁵ = pi³³.
 3 sg. ghost =DAT DIR- scared =SFX:impft

‘S/he is scared of the ghost.’

⁴The vowel phoneme /ʌ/ always acts as a tense vowel, and therefore must be derived from */e/.

7. Another Type of Derivation in Initials

Besides vowel alternation in the directional prefix, Mu-nya has another type of ucV to cV derivation accomplished by changing stem initials: a cV with a voiceless (aspirated/unaspirated) initial is derived from an ucV with prenasalized-voiced initial.

- (14) $ti^{55}la^{33}$ fa^{33} - $mbu^{55}ndz\epsilon^{53}$ ra^{33} .
 knot DIR- come loosed DEC [+realize]
 ‘A knot was loosed. (My shoelaces came undone.)’

- (15) ηi^{55} $ti^{55}la^{33}$ fa^{33} - $pu^{55}t\epsilon\epsilon^{53}$ ηe^{33} .
 1sg. [ERG] knot DIR- untied DEC [+certain]
 ‘I untied the knot. (I untied my shoelaces.)’

This type of derivation is rare, and unproductive. Huang (1985) considered this type to be a grammatical operation retained from old Mu-nya.

- ne^{33} - $ng\Lambda^{55}$ ‘(stick has been) broken’ > $n\Lambda^{33}$ - $q\Lambda^{55}$ ‘break (a stick)’
 ne^{33} - $ndzwe^{55}$ ‘(rope has been) snapped’ > ne^{33} - $nt\zeta^hwe^{55}$ ‘cut (a rope)’

Some verbs are a compound style with both vowel alternation in the prefix and consonantal alternation in the stem.

- (16) $ndz\epsilon^{55}$ $n\tilde{e}^{33}$ - $ndz\omega^{53}$ ra^{33} .
 wall DIR- fall DEC [+realize]
 ‘The walls have collapsed.’
- (17) ηi^{55} $ndz\epsilon^{55}$ ni^{33} - $t\epsilon\omega^{53}$ ηe^{33} .
 1sg. [ERG] wall DIR- pull DEC [+certain]
 ‘I have collapsed the walls.’

8. Causative Sentences

These cV are also used in causative sentences. The Mu-nya causative sentence structure frame is as follows:

❖ Causative Construction of Mu-nya

Subject = **ji** || sb. = **le** Object cV = **t^hɕ^hu⁵⁵** DEC.
 Causee =ERG Agent =DAT sth.=∅ DIR-√cV = CAUS

* The || indicates the boundary between the Subject part and the Predict part.

- (18) **ŋi⁵⁵** **ʔe⁵⁵tsu³³ = le³³** **va⁵⁵** **ni³³- rø⁵⁵ = t^hɕ^hu⁵⁵** **ŋe³³.**
 1 sg. [ERG] 3 sg. = DAT butter DIR- melt =CAUS DEC [+certain]

‘I made him melt (the piece of) butter.’

- (19) **ŋi⁵⁵** **ʔe⁵⁵tsu³³ = le³³** **pəe³³re⁵⁵** **t^he³³- ra⁵⁵ = t^hɕ^hu⁵⁵** **ŋe³³.**
 1sg.[ERG] 3 sg. =DAT towel DIR- dry =CAUS DEC [+certain]

‘I made him dry the towel.’

- (20) **ŋi⁵⁵** **ʔe⁵⁵tsu³³ = le³³** **ʔe⁵⁵tsu³³ tɕu⁵⁵**
 1sg. [ERG] 3 sg. =DAT this water

t^hi³³- ku⁵⁵ = t^hɕ^hu³³ **ŋe³³.**
 DIR- freeze =CAUS DEC [+certain]

‘I made him freeze the (bucket of) water.’

9. Conclusion

Sun (1983) provided the earliest brief description of Mu-nya and indicated that its verbs possess stem vowel alternation determined by the person and number of subjects, but did not analyze the grammatical function of alternations found in directional prefixes. Huang (1985) demonstrated that vowel alternation occurs depending on the person of the subject according to vowel types. Based on her work, this paper has verified agreement with the person of the subject, and the classification of Mu-nya verbs into ucV/cV according to the distribution of SFXs and DEC.

Regrettably Huang (1985) treated Mu-nya vowel alternation occurring in directional prefixes as a grammatical phenomenon under concepts of *zidòngtài* 自动态 and *shǐdòngtài* 使动态, though typically the term *zidòngtài* 自动态 [lit. intransitive mood] indicates ucV used in an intransitive sentence: a verb predicate with a noun as a subject; and *shǐdòngtài*

使动态 [lit. causative mood] includes (1) cV used in a transitive sentence: a verb predicate with two nouns, one for the subject and another for the object., and (2) cV used in a causative sentence.

However, in Mu-nya, (1) and (2) exhibit two different syntactic structures. Thus, it is inappropriate to treat them under the single concept of shǐdòngtài 使动态. The vowel alternation occurring in directional prefixes is an important morphological phenomenon of derivation from intransitive to transitive, generated under the causative structure in the Mu-nya language.

Supplementary Note:

I specialize in analyzing the issue of causative structure in Mu-nya. I presented another paper at the 48th International Conference on Sino-Tibetan Languages and Linguistics: 20–23 AUG 2015 held at the University of California, Santa Barbara, under the title of “Causative Constructions in the Mu-nya Language”. Later, I translated the report into Japanese and presented it for the volume *Grammatical Phenomena on Sino-Tibetan Languages 2: Aspects of Causative Construction*, in 2019. See below:

池田 巧 (Ikeda, Takumi)

2019 ムニャ語の自他動詞と使役構文. 『シナ=チベット系諸言語の文法現象2: 使役の諸相』京都大学人文科学研究所: 115–134頁.

Abbreviations

| | | | |
|--------|--------------------|------|---------------------|
| ERG | Ergative | P | Predicate |
| AUX | Auxiliary | PCL | Particle |
| CAUS | Causative | pft. | perfect |
| CLF | Classifier | PHB | Prohibitive |
| DAT | Dative | pl. | plural |
| DEC | Declarative | S | Subject |
| DIR | Directional prefix | SFX | Suffix |
| GEN | Genitive | sb. | somebody |
| impft. | imperfect | sg. | singular |
| IRG | Interrogative | sth. | something |
| MOD | Modal | cV | controllable Verb |
| NEG | Negative | sV | stative Verb |
| NMLZ | Nominalizer | ucV | uncontrollable Verb |
| NUM | Numeral | | |

References

[English]

Ikeda, Takumi (池田 巧)

- 2003 On pitch accent in the Mu-nya language. *Linguistics of Tibeto-Burman Area*. 25.2: 27–45. University of California, Berkeley.
- 2007 Exploring the Mu-nya people and their language. *ZINBUN*. 39: 19–147. Institute for Research in Humanities, Kyoto University.
- 2008 200 Example Sentences in the Mu-nya Language. *ZINBUN*. 40: 71–140. Institute for Research in Humanities, Kyoto University.
- 2013b Verb predicate Structure in the Mu-nya language. Paper presented for the 3rd Workshop on Tibeto-Burman Languages of Sichuan, 2nd–4th SEP 2013 in Paris: Centre National de la Recherche Scientifique.

[Japanese]

池田 巧 (Ikeda, Takumi)

- 2010 ムニャ語の格助詞. 『チベット=ビルマ系言語の文法現象1：格とその周辺』東京外国語大学アジア・アフリカ言語文化研究所：15–28頁.
- 2013a ムニャ語の述詞と文. 『チベット=ビルマ系言語の文法現象2：文の特徴づけと下位分類』東京外国語大学アジア・アフリカ言語文化研究所：365–390頁.
- 2019 ムニャ語の自他動詞と使役構文. 『シナ=チベット系諸言語の文法現象2：使役の諸相』京都大学人文科学研究所：115–134頁.

[Chinese]

戴 庆厦 (Dai, Qingxia) 等

- 1991 《藏缅语十五种》北京燕山出版社.

黄 布凡 (Huang, Bufan)

- 1985 木雅语概况. 《民族语文》1985.3：62–77頁. 又收录在戴庆厦等 (1991: 98–131頁).
- 2007 木雅語. 《中国的语言》北京：商务印书馆：903–923頁.
- 2009 《川西藏区的语言》北京：中国藏学出版社：18–58頁.

池田 巧 (Ikeda, Takumi)

- 1998 木雅語語音結構的幾個問題. 『內陸アジア言語の研究XIII』中央ユーラシア学研究会：83–91頁.

孙 宏开 (Sun, Hongkai)

- 1983 六江流域的民族语言及其系属分类—兼述嘉陵江上游、雅鲁藏布江流域的民族语言. 《民族学报》1983.3：99–273頁. 云南民族出版社.